CLUTCHES — HELICAL SPRING TYPE WITHOUT RELEASE SPRINGS REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers helical spring type clutches that are not equipped with release springs but are adjusted with the rack free to travel (Nos. 1A, 1B, 2A, 3A, and 3B and 4, 5, 6, and 7 types) and associated racks.

1.02 This section is reissued to incorporate material from the addendum in its proper location.

1.03 The arrows used to indicate changes have been omitted.

1.04 Reference shall be made to Section 026-010-711 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

*1.05 Asterisk: Requirements are marked with an asterisk (*) when to check for them would necessitate dismantling or dismounting of apparatus, or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or its performance indicates such a check is advisable.

1.06 Fully Operate: A clutch is said to fully operate if, when current is connected to a winding, the associated armature assumes a position so that:

(a) Updrive: The helical spring is extended and the armature is touching the front stop.

(b) Downdrive: The helical spring is extended and one or both of the non-freezing discs on the armature farthest from the fulcrum are touching the associated magnet core.

(c) Trip Magnet: The non-freezing disc on the armature farthest from the fulcrum touches its associated magnet core.

1.07 Operate: A clutch is said to operate if, when current is connected to a winding, the associated armature assumes a position so that:

(a) Updrive: The armature moves until it touches, or is less than .005" away from the front stop and a gap exists between the tip of the screw gap adjusting screw and the roller arm.

(b) Downdrive: The armature moves until the non-freezing discs touch or are less than .005" away from the core of the front magnet, a gap exists between the tip of the screw gap adjusting screw and the roller arm and the pawl is removed from the rack.

1.08 Non-operate: A clutch is said to non-operate, if, when current is connected to a winding, the associated armature assumes a position so that:

(a) Updrive: The armature is .005" or more away from the front stop. The brush rod may or may not travel and a gap may or may not exist between the tip of the screw gap adjusting screw and the roller arm.

(b) Downdrive: The armature is .005" or more away from the core. The brush rod may or may not travel and a gap may or may not exist between the tip of the screw gap adjusting screw and the roller arm.

1.09 Remove Pawl: A clutch is said to remove the pawl if, when current is connected to its associated downdrive winding, the rack travels downward and the pawl tooth clears the rack in all positions. The downdrive armature may or may not touch the core and a gap may or may not exist between the screw gap adjusting screw and the roller arm.

1.10 Trial: A "trial" for the purpose of this section consists of the application of a specified current for approximately 1/2 second.

1.11 Gauge Divisions: Each division of the screw gap gauge corresponds to approx. .001" movement of the roller arm with respect to the up or downdrive armature and each division of the armature location gauge corresponds to approx. .001"

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movement of the armature with respect to the front stop.

1.12 Sender Selector Type Line Finders: If, in checking or readjusting clutches on sender selector type line finders, it is necessary to raise and keep the brush rod off normal, consult the circuit drawing for information as to the necessary relays which must be blocked to prevent circuit reactions, and to prevent the downdrive armature from operating.

1.13 After checking or readjusting a clutch where it was necessary to disturb the wiring to the clutch, make a check of the terminal block wiring for loose connections or broken wires and correct as necessary.

1.14 All requirements shall be met with the cork rolls revolving and with the brush rod free to travel when the clutch is operated.

1.15 Carrying Case for Small Clutch Gauges and Tools: The KS-8349 carrying case should be used to protect the screw gap and armature location gauges and may also be used for other small tools and gauges used on clutches.

1.16 Gear Case and Bearing Box Stops: If gear case and bearing box stops are to be installed on the frame and the associated clutches are to be readjusted, the stops should be installed before readjusting the clutches.

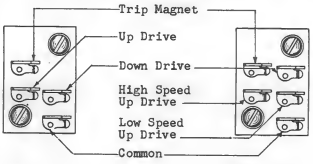

Fig. 1 - 1 Type Clutch

Fig. 2 - 2 Type Clutch

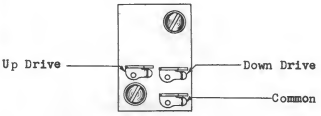

Fig. 3 - 3 Type Clutch

1.17 Terminal Designations - Figs. 1, 2, and 3: The terminal designations of 1, 2 and 3 type clutches are shown in the accompanying figures. On 4, 5, 6 and 7 type clutches, the terminal designations appear on the terminal block.

1.18 Requirements for rack tongue tension and position, rack coupling pin engagement, clearance between trip armature extension and rack and clearance between trip armature extension and multiple brush frame are covered in Sections 026-125-701 to 026-125-707 covering the particular type of elevator apparatus involved.

1.19 Make Busy Information: Before making any of the inspections or readjustments covered in this section, make the circuit busy in the approved manner.

2. REQUIREMENTS

REQUIREMENTS FOR RACKS

2.01 Bow of Rack - Fig. 4 (A): With the rack held vertically, any bow in the entire length of the rack shall not exceed
For line finder racks - 1/4"
For all other racks - 5/16"
Gauge by eye.

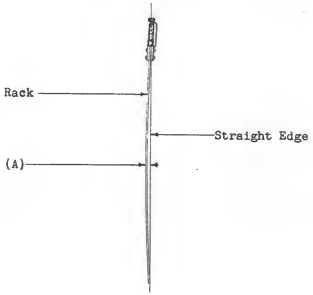

Fig. 4 - Bow of Rack

2.02 Cutting of Rack - Fig. 5 (A): There shall be no tendency for the rack to cut on the earlier type rack guide. Smooth, bright edges on the rack due to normal wear shall not be considered as an indication of cutting. Gauge by eye.

2.03 Slipping of Rack: There shall be no perceptible slip between the rack and cork roll when the updrive magnet of the clutch is fully operated and with the normal number of brushes tripped. Gauge by eye.

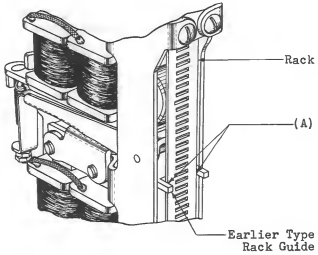

Fig. 5 - Relation of Rack and Earlier Type Rack Guide

GENERAL CLUTCH REQUIREMENTS

2.04 Clutch Location

(a) There shall be a clearance between adjacent clutches. Gauge by eye.

(b) Fig. 6 (A).

Test: The clearance between the clutch top locating plate and the top of the frame on the side nearest the plate shall be
Max. .010"
Gauge by eye.

Readjust: The clutch shall fit snugly in a vertical direction against the top locating plate. If the top of one side of the clutch frame rests against the plate, this requirement is met. Gauge by eye.

*(c) The vertical alignment of the clutch shall be such that, with the rack uncoupled from the brush rod as covered in 3.006, the mean of the sideways swing of the rack top, when it is at the upper limit of its travel, shall not be more than 1/16" away from the centerline of the brush rod. Gauge by eye. The thickness of the rack is approximately 1/16".

2.05 Clutch Retaining Spring Tension - Fig. 6 (B): The clutch retaining

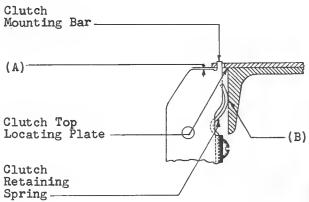

Fig. 6 - Clutch Location

spring shall have sufficient tension to hold at least one of the clutch mounting ears firmly against the front of the slot in the clutch locating plate. Gauge by eye and by feel.

REQUIREMENTS FOR TRIP MAGNET

2.06 Clearance Between Bent Portion of Trip Armature and Magnet Core - Fig. 7 (A): The clearance between the bent portion of the trip armature and the magnet core with the armature in the operated position shall be
Min. .028", Max. .052"
Operate the armature manually and use the No. 81 gauge.

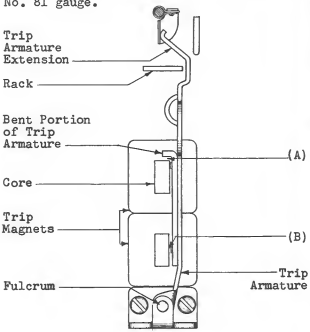

Fig. 7 - Trip Magnet and Associated Parts

2.07 Clearance Between Non-freezing Disc on Trip Armature and Core Nearer Fulcrum - Fig. 7 (B): With the trip armature fully operated electrically, the clearance between the non-freezing disc on the trip armature and the core nearer the fulcrum shall be
Min. - Shall not touch, Max. .010"
Use the KS-6909 gauge. To check the minimum clearance, insert the .0015" blade of the KS-6909 gauge between the disc and the core and electrically operate the trip armature. Attempt to withdraw the gauge. The minimum limit is met if this gauge does not bind.

2.08 Trip Magnet Electrical Requirements: The trip armature shall fully operate and rotate the trip rod on
Max. .200 amp.
Where two trip magnets are wired in parallel, the trip armature shall fully operate on
Max. .400 amp.

REQUIREMENTS FOR HIGH AND LOW SPEED UP DRIVES

2.09 Unoperated Core Gap - Fig. 8 (A): With the armature resting against its back stop the gap between the top of the non-freezing disc on the armature farthest from the fulcrum and the core of the corresponding coil shall be
Min. .110", Max. .120"
Use the No. 84B gauge.

2.10 Operated Core Gap - Fig. 9 (A): With the armature fully operated, the gap between the armature and core of the magnet further from the fulcrum measured at a point between the two non-freezing discs on the armature shall be
Min. .016", Max. .024"
Use the No. 82B gauge.

2.11 Gap Between Screw Gap Adjusting Screw and Roller Arm - Fig. 9 (B): With the clutch updrive fully operated, when the screw gap adjusting screw is closest to the roller arm, the gap between the tip of the screw and the roller arm shall be

Test	-	Min. 13 divisions, Max. 34 divisions
Readjust	-	Min. 18 divisions; Max. 22 divisions

Use the No. 163B screw gap gauge.

2.12 Updrive Electrical Requirements-

(a) Operate: The clutch updrive shall operate each of 6 consecutive trials (See 1.10) on
Test - Max. .320 amps.
Readj. - Max. .300 amps.
Use the No.162B armature location gauge.

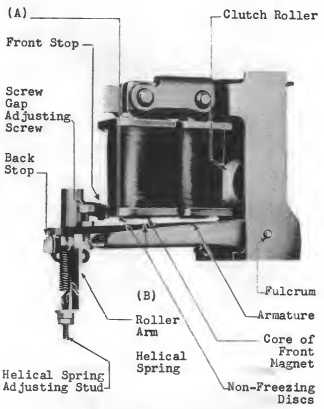

Fig. 8 - Up Drive Armature in Normal Position

(b) Non-operate: The clutch updrive shall non-operate at least once in 6 trials on

Test	-	Min. .260 amp.
Readjust	-	Min. .280 amp.

Use the No. 162B armature location gauge.

Check (a) and (b), at a time when no other brush rods on the same side of the frame are being driven upward. That is, if another clutch updrive operates as a trial is being applied, repeat that trial.

2.13 Helical Spring Tension - Fig. 8 (B) With the armature resting against the back stop, the gap, if any, between the tip of the screw gap adjusting screw and the roller arm shall not exceed .015" with the following tension applied to the roller arm just behind the helical spring adjusting stud.

		Translator and Line Finder Clutches	All Other Clutches
Test	-	1500 grams	1400 grams
Readjust	-	1600 grams	1450 grams

Use the Nos. 92E and 93B gauges.

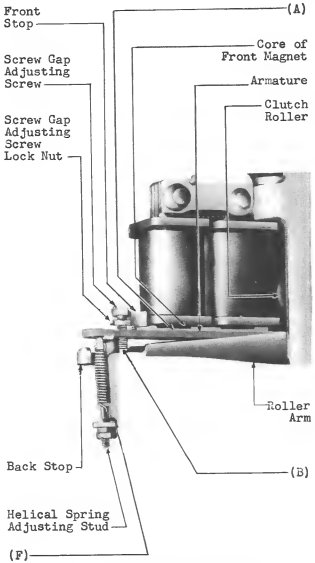

Fig. 9 - Up Drive Armature Fully Operated

2.14 Position of Helical Spring Adjusting Stud (Turnover Only) - Fig. 9 (F): After all adjustments have been made, there shall be at least one thread showing above the roller arm to provide for further tensioning of the spring. Gauge by eye.

REQUIREMENTS FOR DOWN DRIVES

2.15 Unoperated Core Gap - Fig. 10 (A): With the armature in its normal position, the gap between the top of the non-freezing disc on the armature farthest from the fulcrum and the core of the corresponding coil shall be
Min. .080", Max. .100"
Use the No. 83B gauge.

2.16 Clearance Between Front Stop and Armature - Fig. 11 (A): With the armature fully operated there shall be clearance between the armature and front stop. This requirement applies to 1, 2, 3, 4 and 6 type clutches only, since there are no front stops on 5 and 7 type clutches.

2.17 Gap Between Screw Gap Adjusting Screw and Roller Arm - Fig. 11 (B): With the clutch downdrive fully operated, when the screw gap adjusting screw is closest to the roller arm, the gap between the tip of the screw and the roller arm, shall be

Test	- Min. 8 divisions
	- Max. 34 divisions
Readjust	- Min. 19 divisions
	- Max. 25 divisions

Use the No. 163B screw gap gauge.

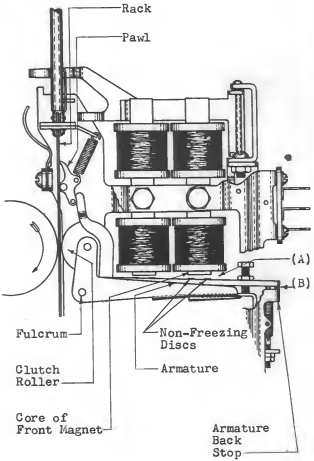

Fig. 10 - Downdrive Armature in Normal Position (Earlier Type Pawl)

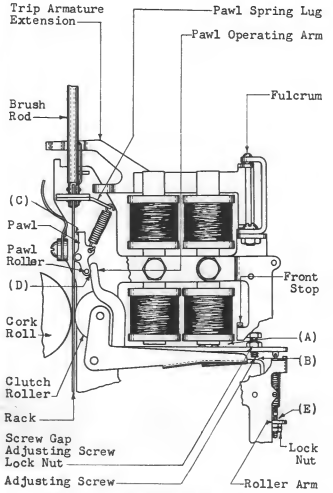

Fig. 11 - Downdrive Armature in Fully Operated Position (Later Type Pawl)

2.18 Downdrive Electrical Requirements

(a) Operate: The clutch downdrive shall operate each of 6 consecutive trials (see 1.10) on

Nos.1A, 2A, 4A and 5A Clutches	Nos. 1B, 3A 3B, 4B, 6A, 6B 7A and 7B Clutches
Test - Max. .215 amp.	Max. .245 amp.
Readjust - Max. .170 amp.	Max. .210 amp.

Use the No.162B armature location gauge.

(b) Non-operate: The clutch downdrive shall non-operate at least once on 6 trials on

Nos.1A, 2A, 4A and 5A Clutches	Nos. 1B, 3A 3B, 4B, 6A, 6B 7A and 7B Clutches
Test - Min. .115 amp.	Min. .150 amp.
Readjust - Min. .140 amp.	Min. .180 amp.

Use the No. 162B armature location gauge.

(c) Remove Pawl (Test Only): The clutch downdrive shall remove the pawl each of 6 consecutive trials on

Nos. 1A, 2A, 4A and 5A Clutches	Nos. 1B, 3A 3B, 4B, 6A, 6B, 7A and 7B Clutches
Max. .190 amp.	Max. .225 amp.

Check (a), (b) and (c) at a time when no other brush rods on the same side of the frame are being driven downward. That is, if another clutch downdrive operates as a trial is being applied, repeat that trial.

2.19 Pawl Clearance - Fig. 11(C): With the clutch roller pressed against the rack and the rack pressed against the cork roll with just sufficient pressure to drive the rack down without slipping, the pawl shall not touch the rack in any vertical position the rack may assume.

Gauge by feel.

2.20 Pawl Engagement - Fig. 10 (E): The pawl shall engage the rack sufficiently to prevent the rack from slipping or dropping for any position the rack may assume when a .020" thickness gauge is placed between the back stop and armature. Use the No. 80B gauge.

*2.21 Pressure of Pawl Roller Against Pawl Operating Arm - Fig. 11 (D): The pressure of the pawl roller against the operating arm shall be
Min. 55 grams, Max. 100 grams
Use the No. 79C gauge.

2.22 Position of Helical Spring Adjusting Stud (Turnover Only) - Fig. 11 (E): After all adjustments have been made, there shall be at least one thread showing above the roller arm to provide for further tensioning of the spring. Gauge by eye.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, Test Apparatus and Materials

Code or Spec.No.	Description
Tools	
273	Adjuster
310B (2 required)	9/32" Hex. Open Double End Offset Wrench
325B	Adjuster
335	Front Stop Lug Adjuster

Code or Spec.No.	Description
379A	Adjuster
467A	9/32" Hex. Open Double End Flat Wrench (See 3.002)
589A	Adjuster
KS-8349	Carrying Case
KS-6278	Connecting Clips as required
KS-8097	5/8" and 7/16" 12-Point Off-set Box Wrench
R-2512	Adjustable Wrench
KS-14250,L1 (or the replaced flashlight equipped with KS-7742 bottom cap)	Flashlight
-	3" Cabinet Screwdriver
-	4" Regular Screwdriver
-	Double Grip Screwdriver
-	FT10 Oil Stone, Behr Manning Co. (or equivalent)
-	7/16" and 1/2" 12-Point Double Offset Super Wrench (J. H. Williams & Co. No. 8725)
Gauges	
79C	0-200 Gram Push-Pull Tension Gauge
80B	.010"-.020"-.030" and .015"-.035" Thickness Gauge
81	.028" and .058" Thickness Gauge
82B	.016" and .024" Double End Thickness Gauge
83D	.080" and .100" Double End Thickness Gauge
84B	.110" and .120" Double End Thickness Gauge
92E	.015" Thickness Gauge
93B	Gram Weights
162B (or the replaced 162A)	Armature Location Gauge
163B (or the replaced 163A)	Screw Gap Gauge
KS-6909	Thickness Gauge Nest

Code or Spec.No.	Description
Test Apparatus	
35 Type	Test Set
- (2 required)	W2W cord 6 feet long equipped with 1 No. 310 plug, 1 No. 360B tool and 1 No. 360C tool (2W17A cord)
- (2 required)	No. 893 cord 6 feet long equipped with 2 No. 360A tools (1W13B cord)
Materials	
KS-2423	Cloth
P-173711	Magnet Clamping Clearance Screw (See 3.009 (5))
KS-7860	Petroleum Spirits
-	Spring Clothespin

3.002 No. 467A Wrench: In these procedures, the No. 310B wrench is specified for use on the clutch adjusting screws and adjusting nuts. In case the opening of the No. 310B wrench is too small to fit the screws or nuts, use the No.467A wrench instead of the No. 310B wrench.

3.003 Method of Connecting 35 Type Test Set to Clutch Up and Downdrives

Updrives - Battery Connected to Common Terminal of Clutch

(1) Set all keys on the test set normal and slide all the rheostat sliders to the right. Insert the No. 310 plug of a W2W cord into the TEST T & R jack of the test set. Connect the black (ring) conductor to the updrive terminal of the clutch and connect the white (tip) conductor to ground.

(2) Insert the No. 310 plug of another W2W cord into the TEST EXT KEY 4W jack of the test set and connect the white (tip) conductor of this cord to the downdrive terminal of the clutch. Operate the 3 knife switches designated "4" so as to engage the jaws designated "O" and operate the BATT & GRD CO key. Move the sliders of the No. 4 rheostat to the extreme left. By this arrangement, telegraph keys, Nos. 1, 2, and 3 can be used to apply current flow values to the updrive while key No.4 is used to operate the

downdrive in restoring the brush rod to normal.

(3) To obtain a given current flow value, such as the "operate" current, manually hold the updrive armature in its unoperated position. Operate the circuit closing lever associated with telegraph key No. 1 and move the sliders of the No.1 rheostat until the desired current flow value is obtained. To obtain a second current flow value such as the "non-operate" current, release telegraph key No. 1, operate key No. 2 and move the sliders of the No. 2 rheostat. To obtain a third current such as is required to fully operate the clutch updrive in 2.11 (Gap Between Screw Gap Adjusting Screw and Roller Arm) operate the 3 knife switches designated "3" so as to engage the jaws designated "O" and move the sliders of the No. 3 rheostat to the extreme left. When readjusting to the electrical values, check current flow values frequently so as to insure that the temperature rise of the magnet caused by current flowing through it will not affect the resulting adjustment.

Updrives - Ground Connected to Common Terminal of Clutch

(4) Connect the test set to the clutch updrive as covered in (1), connecting battery instead of ground to the white (tip) conductor of the cord plugged into the test set TEST T & R jack. Operate the REV key. Obtain the desired current flow value as in (3). It will be necessary to operate the downdrive manually in order to restore the brush rod.

Downdrives

(5) In checking downdrives, the connections are the same as described in (1) to (4) inclusive except that the connections to the up and downdrive terminals are interchanged.

3.004 Checking Requirements with Brush Rod in Motion: To avoid damaging the cork rolls in checking 2.11 (Gap Between Screw Gap Adjusting Screw and Roller Arm) and 2.12 (Updrive Electrical Requirements), where the check is made with the brush rod in motion, take care not to keep the clutch energized after the brush rod reaches its limit of travel.

3.005 Method of Removing Rack: Raise the brush rod a few terminals. Uncouple the brush rod from the rack by inserting the blade of the 3" cabinet screwdriver between the rack tongue and brush rod as shown in Fig. 12 and turning the screwdriver just enough to disengage the tongue from the brush rod.

Caution: Insert the blade of the screwdriver just below the horizontal portion of the lip of the rack tongue so as to affect the tension of the rack tongue as little as possible.

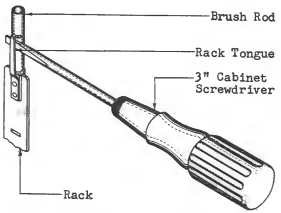

Fig. 12 - Method of Uncoupling Rack from Brush Rod

Lift the brush rod away from the rack with the other hand. The rod now has no means of support, so it will be necessary to hold it in place with a spring clothespin just above a bearing plate as shown in Fig. 13. Lift the rack out from behind the clutch.

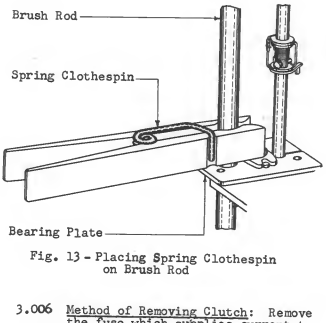

Fig. 13 - Placing Spring Clothespin on Brush Rod

3.006 Method of Removing Clutch: Remove the fuse which supplies current to the clutch. Uncouple the rack from the brush rod as outlined in 3.005. Loosen the clutch mounting screw with the double grip screwdriver. Where the clutch mounting screw will not budge, apply the R2512

wrench to the square shank of the double grip screwdriver thereby obtaining greater leverage. Lower the clutch until the two projections at the top just clear the holes in the clutch top locating plate, taking care not to disturb the trip rod rotating lever. Pull the top of the clutch away from the frame until it is clear of the locating plate and then lift it up to disengage the mounting screw at the bottom of the clutch. Take care when removing and handling the clutch while making adjustments not to break the wires connected to the soldering lugs.

3.007 Method of Remounting Clutch: Remount the clutch on the frame making sure that the clutch is satisfactorily located as outlined in 2.04 and that the clutch retaining spring tension is satisfactory as outlined in 2.05. Remount the fuse that was removed. Check that the commutator and multiple brushes are located correctly as covered in 3.008.

3.008 Rechecking Other Requirements After Clutch is Shifted or Removed from Frame: If, for any reason, it is necessary to shift the position of the clutch or to remove the clutch from the frame, make sure that the commutator brush and multiple brushes are located in accordance with the requirements specified in the sections covering the particular type of apparatus involved. This is important because the vertical location of the entire brush rod assembly may have been affected by shifting the clutch.

3.009 Lowering Rear Magnet and Raising Front Magnet of Updrives

Lowering Rear Magnet

(1) Remove the rack and support the brush rod with the spring clothespin as outlined in 3.005. Remove the clutch from the frame as outlined in 3.006. It is not necessary to remove the wires, but the clutch should be supported in such a way as to prevent the wires from being broken or the insulation from being damaged.

(2) With the armature operated manually check that there is a minimum clearance of .006" between the top surface of the non-freezing disc nearest the fulcrum and the associated magnet core using the KS-6909 gauge or if the clutch is not equipped with non-freezing discs at this point, check to see that a clearance of .010" exists between the armature and the magnet core nearer the fulcrum using the .010" blade of the KS-6909 gauge.

(3) If this clearance is appreciably greater than .006" or .010", depending on the clutch, loosen the rear magnet clamping screw with the KS-8097 wrench as shown in Fig. 14 and lower the rear magnet. On some earlier clutches it will be necessary to use the Williams & Co. super wrench to loosen the magnet clamping screw. In making this adjustment, reduce the clearance as much as possible (without going below the specified value) so as to get the maximum pull from the rear magnet. This adjustment may be facilitated by placing the .008" of .012" blade of the KS-6909 gauge between the armature and the core of the rear magnet and lowering the magnet until the gauge is tight. Make sure that the face of the rear magnet core is parallel to the surface of the armature. Securely retighten the magnet clamping screw, applying enough force to insure that the magnet will not be jarred out of position during service. Then recheck the clearance between the core and armature to be sure that it is not less than the specified value with the armature manually operated.

Raising Front Magnet

(4) If it is not possible to lower the rear magnet sufficiently to obtain the proper clearance between the non-freezing discs or core of the rear magnet and the armature, as outlined in (3) proceed as follows. Raise the front stop with the No. 273 adjuster if the clutch is of the 1, 2 or 3 type or with the No.335 adjuster as shown in Fig. 18 if the clutch is of the 4,

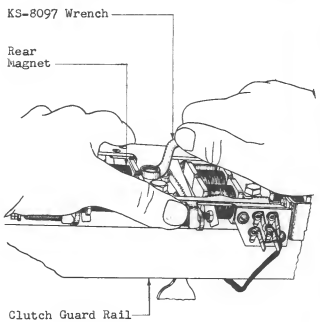

Fig. 14 - Method of Loosening Rear Magnet Clamping Screw

5, 6 or 7 type, sufficiently to allow the armature to come up against the front magnet core. Loosen the front magnet clamping screw with the KS-8097 wrench. Raise the front magnet until the clearance between the armature and the core of the rear magnet is satisfactory. Adjust the front stop so that this clearance can be maintained and raise or lower the front magnet until the requirements covering operated core gap is met. Make sure that the face of the core of the front magnet is parallel to the surface of the armature. Securely retighten the magnet clamping screw, applying enough force to insure that the magnet will not be jarred out of position during service. Recheck 2.09 (Unoperated Core Gap).

Installing Clearance Screw in Place of Rear Magnet Clamping Screw

(5) In some cases, it may not be possible to lower the rear magnet and raise the front magnet sufficiently to meet the updrive requirements. This is more likely to occur on line finder and translator clutches because of the higher helical spring tension requirement. Where this occurs if, with the armature operated, the clearance between the core of the rear magnet and the armature still exceeds .006" or .010" as indicated in (2) remove the rear magnet clamping screw with the KS-8097 wrench. Substitute a P-173711 clearance screw and lower the rear magnet until the clearance between the armature and the core of the magnet is satisfactory.

Note: The P-173711 clearance screw may be recognized by the undercut.

(6) Remount the clutch as outlined in 3.007.

PROCEDURES FOR RACKS

3.01 Bow of Rack (Rq.2.01)

(1) Remove the rack as covered in 3.005. Hold the rack vertically and place a straight edge, such as another rack, against the front or rear surface of the rack.

(2) If the rack is bowed to such an extent that it requires straightening, straighten it by bending it as a whole and not in sections, and thereby prevent putting a kink in it. If it cannot be straightened in this manner the rack may be straightened in sections, exercising extreme care not to produce kinks in it.

3.02 Cutting of Rack (Rq.2.02)

(1) Whenever the edge of a rack is worn so as to present a flat surface, it is an indication that the rack is being cut on the rack guides. Smooth, bright edges on the rack due to normal wear should not be considered as an indication of cutting.

(2) This condition is usually caused by improper alignment of the clutch with respect to its associated brush rod. Check for alignment, and adjust for it, if necessary, as covered in 3.04.

3.03 Slipping of Rack (Rq.2.03)

(1) If the rack slips it may be due to a binding brush rod in which case refer to the section covering the particular type of elevator apparatus involved.

(2) If the rack is bowed, straighten it as covered in 3.01.

(3) If the rack still slips and an inspection shows that it is not due to incorrect clutch adjustment, it is probably due to oil or grease on the rack or the surface of the cork roll. In this case, clean the rack and cork roll as covered in the section covering friction roll drives.

(4) If the rack only is to be cleaned remove the rack as covered in 3.006. Then clean it with a KS-2423 cloth moistened with KS-7980 petroleum spirits. Remount the rack and check it for slipping.

GENERAL CLUTCH PROCEDURES

3.04 Clutch Location (Rq.2.04)

(1) Before checking the vertical alignment, uncouple the rack from the brush rod as covered in 3.005 and raise the brush rod to a point near the upper limit of its travel. Hold the brush rod in this position by means of the spring clothspin as shown in Fig. 13, preferably between banks Nos. 2 and 3.

(2) If any part of the requirement is not met, loosen the clutch mounting screw as outlined in 3.006 and shift the clutch as required. If the proper clearance between clutches cannot be obtained by shifting one clutch it may be due to failure of one or both of the adjacent clutches meeting this requirement. In this case loosen the clutch mounting screws of these clutches and shift them until the requirement

is met on all the clutches. With the clutches properly located, securely tighten the clutch mounting screws that were loosened.

(3) Check 2.05 (Clutch Retaining Spring Tension) and the location of the commutator brush and multiple brushes. (See 3.008).

3.05 Clutch Retaining Spring Tension (Rq.2.05)

(1) Remove the rack as outlined in 3.005 and the clutch as outlined in 3.006.

(2) Make sure that the two retaining spring mounting screws are tight. If necessary, adjust the retaining spring tension by prying the spring away from the frame with the 4" regular screwdriver.

(3) Remount the clutch on the frame, making sure that 2.04 (Clutch Location) is met. Reassemble the rack and make sure that the commutator brush and multiple brushes are correctly located. (See 3.008).

PROCEDURES FOR TRIP MAGNET

3.06 Clearance Between Bent Portion of Trip Armature and Magnet Core (Rq.2.06)

3.07 Clearance Between Non-Freezing Disc on Trip Armature and Core Nearer Fulcrum (Rq.2.07)

(1) To readjust it may be necessary to remove the clutch from the frame as covered in 3.006.

(2) In some cases, it may be possible to meet both of these requirements by applying the No. 325B adjuster to the trip armature between the core of the magnet nearer the fulcrum and the fulcrum and adjusting the trip armature. If both requirements cannot be met by adjusting the trip armature in this manner, proceed as follows.

(3) Loosen the two trip armature bracket mounting screws with the 4" regular screwdriver using the No. 310B wrench, if necessary, to hold the nuts. Position the trip armature bracket as required and securely retighten the screws.

(4) If the clutch was removed, remount it as covered in 3.007.

3.08 Trip Magnet Electrical Requirements (Rq.2.08)

(1) If the requirement is not met this may be caused by a binding trip rod or by faulty trip armature extension or rotating lever adjustment. Refer to the section covering the particular type of elevator apparatus involved for the method of correcting these conditions.

PROCEDURES FOR HIGH AND LOW SPEED UP DRIVES

3.09 Unoperated Core Gap (Rq.2.09)

(1) Adjust the armature backstop by bending it up or down as required using the No. 273 adjuster as shown in Fig. 15.

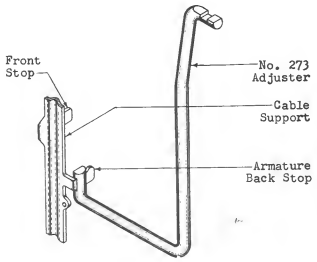

Fig. 15 - Adjusting Armature Back Stop

3.10 Operated Core Gap (Rq.2.10)

3.11 Gap Between Screw Gap Adjusting Screw and Roller Arm (Rq.2.11)

3.12 Updrive Electrical Requirements (Rq.2.12)

3.13 Helical Spring Tension (Rq.2.13)

(1) General: Connect the 35 type test set to the clutch as covered in 3.003.

Operated Core Gap

(2) To check the operated core gap fully operate the updrive. If necessary manually raise the armature to bring it to the fully operated position. Should the helical spring tension be so great that the armature will not stay in this position, re-

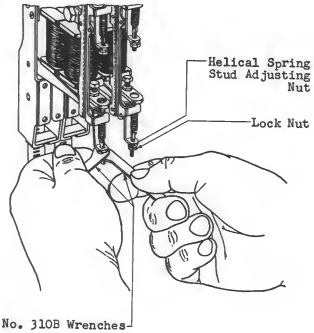

Fig. 16 - Adjusting for Helical Spring Tension

duce this tension just enough to bring about the above condition by loosening the helical spring stud adjusting nut and lock nut with two No. 310B wrenches as shown in Fig. 16.

(3) With the armature in the fully operated position, check the operated core gap with the No. 82B gauge as shown in Fig. 17. Observe that the .016" end of the gauge is free and the .024" end of the gauge is tight in the gap.

(4) Be sure that the gauge is not applied on top of the non-freezing disc. To insure this, place the gauge on top of the nearest non-freezing disc, and then energize the magnet and push the gauge away until it snaps off of the disc and the armature is felt or seen to move. Also work the gauge back and forth between the discs which will act as stops for the gauge.

(5) De-energize the magnet.

(6) Adjust the front stop up or down as required using the Nos. 273 or 335 adjuster as required. Use the notch in the shorter arm of the No. 273 adjuster for making this adjustment on 1, 2, and 3 type clutches in the same manner as adjusting the back stop as shown in Fig. 15, and the No. 335 adjuster for making the adjustment on 4, 5, 6 and 7 type clutches as shown in Fig. 18.

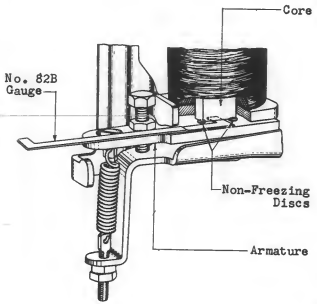

Fig. 17 - Checking Operated Core Gap

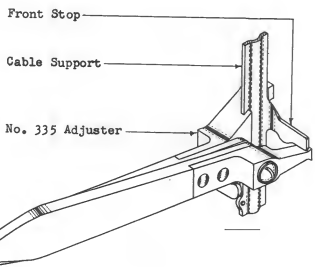

Fig. 18 - Adjusting Front Stop

Checking Test Requirement for Gap Between Adjusting Screw and Roller Arm

(7) With the 35 type test set connected to the clutch as covered in 3.004, fully operate the clutch and visually make sure that the clutch has some screw gap. A screw gap is essential to get an indication of the point at which the adjusting screw is closest to the roller arm. Operate the down drive magnet to restore the clutch to normal.

(8) Insert the No. 310 plug of a W2W cord into the SIGNAL BAT & GRD jack of the test set. Make sure that a 48 volt lamp is in the lamp socket and connect the black (ring) conductor of the cord to the common terminal of the clutch, or some other source of 48 volts. Operate the knife switch designated "L" to the "500 and LAMP" position.

(9) Mount the No. 163B screw gap gauge on the roller arm as shown in Fig. 19. To do this, back off the mounting bracket clamping screw as far as possible. Hold the contact end of the contact arm down against the gauge frame. This will permit the gauge to be mounted on the roller arm without damaging the contact arm. Insert the jaws of the bracket over the vertical portion of the roller arm with the contact arm above the armature. Raise the gauge on the roller arm until it rests against the under-surface of the roller arm. Tighten the clamping screw finger tight to hold the gauge in position. Connect the white (tip) conductor of the W2W cord in SIGNAL BAT & GRD jack of the test set to the pin terminal of the gauge.

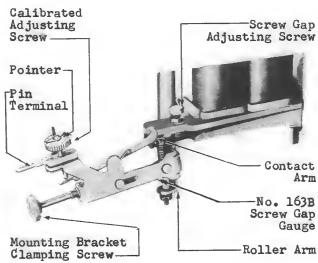

Fig. 19 - Checking Gap Between Screw Gap Adjusting Screw and Roller Arm

(10) To gauge the screw gap, fully operate the clutch. As the brush rod travels upward, carefully adjust the calibrated adjusting screw of the gauge until the test set lamp barely flickers or is practically extinguished. Release the clutch when the brush rod approaches the upper limit of travel and restore the brush rod. When the calibrated adjusting screw is correctly set, with the clutch fully operated, the lamp will be lighted only momentarily at the instant the adjusting screw and roller arm assume their closest positions and if the screw is turned part of a division in a counterclockwise direction the lamp will be completely extinguished. The setting of the screw should be based upon the lamp indications obtained from 2 or 3 upward trips of the brush rod. With the armature in the normal position, the lamp should be lighted.

Note: If another clutch updrive on the same side of the frame operates while the calibrated adjusting screw of the gauge is being adjusted, the lamp indication may change. Therefore, set the screw when no other brush rods on the same side of the frame are being driven upward.

(11) With the armature resting against the back stop turn the pointer on the calibrated adjusting screw with the fingers so it lines up with the scribed line on the gauge, taking care not to turn the calibrated screw. Then turn the calibrated adjusting screw in a counterclockwise direction and carefully note the number of divisions the screw is turned before the point is reached where the lamp is again barely lighted. (In determining this point, turn the calibrated adjusting screw until the lamp is extinguished after which turn the screw back to the point where the lamp is barely lighted.) The pointer will aid in counting the number of divisions passed when this point is reached. Each full turn of the screw (12 divisions) corresponds to approx. .012".

Readjusting for Gap Between Screw Gap Adjusting Screw and Roller Arm

(12) Proceed as outlined in (7) to (10) inclusive. Turn the calibrated adjusting screw of the screw gap gauge in a counterclockwise direction as covered in (11) except that the screw should be turned 20 divisions (corresponding to the average adjustment specified). The magnitude of the existing gap should be noted as the screw is being turned the 20 divisions by observing when or whether the lamp

is extinguished as the screw is being set. If the lamp is not extinguished after turning the screw 20 divisions, it is an indication that the screw gap is near or exceeds the maximum permitted gap.

(13) To adjust the gap between the screw gap adjusting screw and roller arm, loosen the screw gap adjusting screw lock nut with one No. 310B wrench, using another No. 310B wrench to hold the screw gap adjusting screw. Turn the adjusting screw in the required direction until the setting is such that the lamp is barely lighted. If the gap is too small turn the adjusting screw in a counterclockwise direction and if it is too large turn it in a clockwise direction. Retighten the adjusting screw lock nut and make sure that the clutch operates and non-operates on the specified currents when checked with the armature location gauge as covered in (14) to (16) inclusive. If not, loosen the screw gap adjusting nut locknut with one No. 310B wrench, using another No. 310B wrench to hold the adjusting nut. Position the screw gap adjusting nut as required and retighten the adjusting nut lock nut. Recheck that the gap between the screw gap adjusting screw and the roller arm is still within the specified limits as covered in (7) and (11) and if not, refine the adjustments as required.

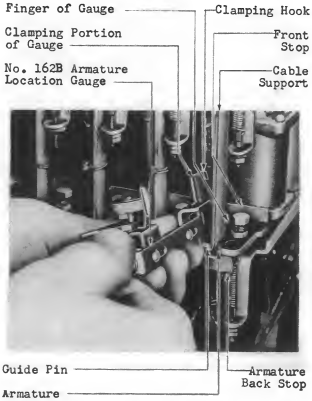

Fig. 20 - Method of Mounting No. 162B Armature Location Gauge

Checking Updrive Electrical Requirements

(14) Mount the No. 162B armature location gauge on the cable support of the clutch. To do this back off the clamping screw until there is about 1/2" between the undersurface of the head of the screw and the clamping bracket. With the calibrated adjusting screw uppermost, hold the gauge and insert it between the clutch being adjusted and the clutch to the left, tilting the clamping portion of the gauge slightly to the left and downward toward the magnets and engaging the guide pin in the angle formed by the armature backstop as shown in Fig. 20. Take special care that, with the gauge in this position the finger of the gauge is under the front stop and above the armature. If it is not in this position the finger may be damaged. Then rotate the gauge to the right to a vertical position and with the index finger of the left hand acting as a guide, hook the clamping hook around the cable support. Hold the gauge in this position with the index finger and tighten the clamping screw securely as shown in Fig. 21.

(15) Disconnect the cord from the screw gap gauge and transfer it to the pin terminal of the armature

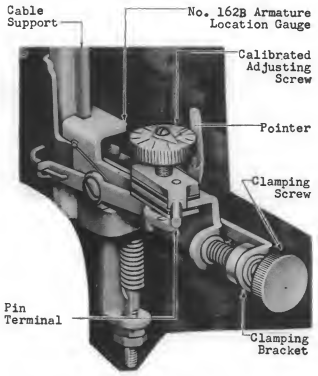

Fig. 21 - No. 162B Armature Location Gauge Mounted on Cable Support

location gauge. Fully operate the clutch and carefully adjust the calibrated adjusting screw of the armature location gauge so that the lamp just lights or flickers. When the calibrated adjusting screw is correctly set, the lamp will be extinguished or will flicker when the clutch is operated. Turn the pointer on the calibrated adjusting screw with the fingers until the pointer lines up with the scribed line on the gauge. Then turn the calibrated adjusting screw 5 divisions in a counterclockwise direction. The resulting contact setting will be such that the contact will open as the armature moves closer than .005" from the front stop to permit the operate and non-operate conditions as defined in 1.07 and 1.08 to be gauged. In checking for the operate and nonoperate conditions, obtain the required current flow values as covered in 3.003. Depress the proper key of the 35-type test set for approximately 1/2 second (time required for high speed updrive to travel over approximately 20 bank terminals on line finders and "A" link sender selectors or 30 bank terminals on other circuits) and then release the key long enough for the armature to restore to the back stop. These operations constitute one trial. On a 100 point bank and a high speed updrive it will be possible to complete 3 such trials during the upward travel of the brush rod (2 trials on 40 point line finders and only 1 trial on 20 point line finders). The clutch operates if the lamp is extinguished, even momentarily, during the interval the current is applied; it non-operates if the lamp remains lighted during that interval.

(16) If desired, a KS-14250, List 1 flashlight may be used to give an indication of the gap between the adjusting screw and roller arm in place of the lamp in the 35-type test set. This will eliminate shifting the lead of the cord in the SIGNAL BAT & GRD jack of the test set from one gauge to the other. To use the flashlight, connect one of the terminals of the flashlight to ground by means of a 1W13B cord and KS-6278 connecting clip. With another 1W13B cord, connect the pin terminal of the screw gap gauge to the other terminal of the flashlight instead of to the cord in the SIGNAL BAT & GRD jack. Operate the flashlight switch.

Checking Helical Spring Tension

(17) If no depression is worn in the roller arm beneath the adjusting screw, check the helical spring tension as follows. Suspend the specified weights of the No. 93B gauge just behind the helical spring adjusting stud as shown in Fig. 22 and make sure that the No. 92E gauge binds when placed between the tip of the screw gap adjusting screw and the roller arm.

(18) If a depression is worn in the roller arm beneath the adjusting screw, the No. 92E gauge cannot be used to gauge the .015" clearance between the roller arm and the adjusting screw. In this case, the No. 163B screw gap gauge may be used in place of the No. 92E gauge as outlined in (19).

(19) With the No. 163B screw gap gauge mounted on the clutch as covered

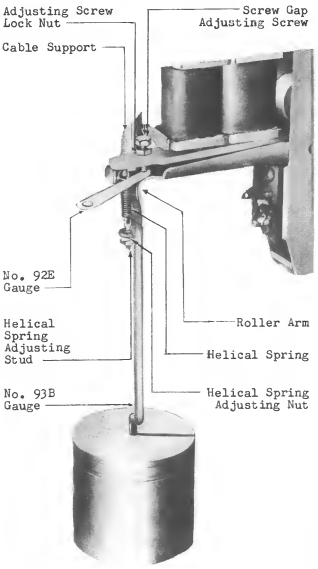

Fig. 22 - Checking Helical Spring Tension

in (9) and with the clutch armature normal, carefully adjust the calibrated adjusting screw of the gauge until the lamp is barely lighted. Then suspend the No. 93B gauge as outlined in (17). If the lamp is extinguished, turn the calibrated adjusting screw in a clockwise direction and carefully note the number of divisions the screw is turned before the lamp lights again. If less than 15 divisions are passed, the requirement is met.

Readjusting for Helical Spring Tension

(20) If the tension is less than the specified minimum, remove the No. 93B gauge and increase the tension as required by means of the helical spring adjusting nut and then recheck that the gap between the screw gap adjusting screw and roller arm and updrive electrical requirements are still met. If these requirements cannot be met with the same adjustment recheck the operated core gap. If it is toward the maximum, adjust toward the minimum. If this does not correct the condition note whether the helical spring has a copper finish on it. If it has not, replace the spring with a spring with a copper finish as outlined in 026-115-801 and adjust the clutch as outlined in the preceding methods. If the clutch still cannot be adjusted, it will be necessary to lower the rear magnet or raise the front magnet as covered in 3.009 in order to increase the pull on the armature and then repeat the adjustments. Securely tighten the helical spring adjusting nut lock nut.

(21) With the screw gap and helical spring tension requirements met, dismount the No.162B armature location gauge and 163B screw gap gauge.

3.14 Position of Helical Spring Adjusting Stud (Rq.2.14)

(No Procedure)

PROCEDURES FOR DOWN DRIVES

3.15 Unoperated Core Gap (Rq.2.15)

(1) Adjust the armature backstop by bending it up or down as required using the notch in the shorter arm of the No. 273 adjuster as shown in Fig. 15.

3.16 Clearance Between Front Stop and Armature (Rq.2.16)

(1) If the front armature stop does not entirely clear the armatures of the 1, 2, and 3 type clutches, adjust the front stop with the No. 273 adjuster as shown in Fig. 15 until it clears the armature in its operated position. If this clearance between the front armature stop and the armature is not present on the 4 and 6 type clutches make the adjustment with the No. 335 adjuster as shown in Fig. 18.

3.17 Gap Between Screw Gap Adjusting Screw and Roller Arm (Rq.2.17)
3.18 Downdrive Electrical Requirements (Rq.2.18)

(1) Check and readjust for the gap between the screw gap adjusting screw and roller arm and the operate and non-operate electrical requirements as described for updrives in 3.10-3.13 When checking the remove pawl electrical requirement, proceed as outlined in (2) and (3) making sure that 2.19 (Pawl Clearance) is met. When checking the electrical requirements remove the No. 163B screw gap gauge.

Remove Pawl

(2) Raise the brush rod and apply the specified current the specified number of trials. The pawl should be removed and the rack should be driven downward without slipping when each trial is applied.

(3) If the pawl is not removed, make sure requirement 2.19 (Pawl Clearance) is met as covered in 3.19 and 3.20. In some cases, failure to remove the pawl may be caused by a burr on the pawl. In this case remove the clutch from the frame as covered in 3.006 and smooth the surface of the pawl with the FT10 oil stone. Remount the clutch on the frame as covered in 3.007.

3.19 Pawl Clearance (Rq.2.19)
3.20 Pawl Engagement (Rq.2.20)

Checking Pawl Clearance

(1) To check the pawl clearance, raise the brush rod manually. Hold the rod to prevent it from dropping and manually raise the downdrive armature. Apply just sufficient pressure to the armature to restore the rack under power taking care not to let the rod drop on the down stop collar while doing this. Make sure that the pawl does not snag or touch the rack as the brush rod restores to normal.

Checking Pawl Engagement

(2) To check the pawl engagement, place the No. 80B gauge between the armature and the backstop. Clamp the gauge in this position with the thumb and index finger, placing the index finger on the backstop and the thumb on the armature as shown in Fig. 23.

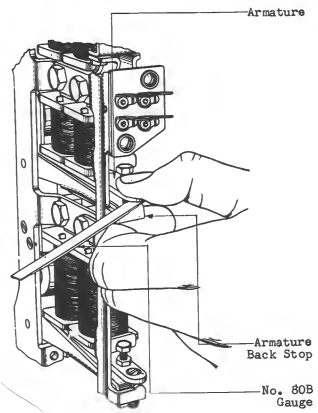

Fig. 23 - Holding Gauge in Position To Check Pawl Engagement

(3) By means of the test set operate the updrive magnet sufficiently to raise the rack several terminals and then allow the updrive to release. Continue this throughout the length of the rack checking that the elevator rod does not drop back as the clutch is released.

Readjusting for Pawl Clearance and Pawl Engagement

(4) Adjust the pawl operating arm in the desired direction very slightly with the No. 273 adjuster as shown in Fig. 24.

(5) In readjusting for these requirements, make an effort to keep the pawl as close as possible to the rack. To insure the best clutch operation and least pawl wear, make the pawl shoulders set against the face of the rack taking care, however, that the pawl clearance requirement is still met.

(6) If difficulty is experienced in adjusting the pawl to meet the requirements recheck 2.15 (Unoperated Core Gap). If the unoperated core gap

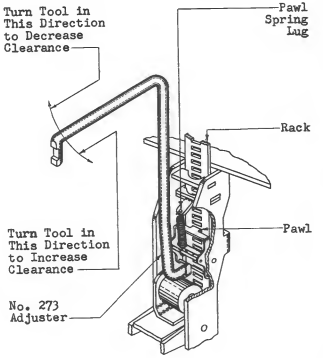

Fig. 24 - Adjusting Pawl Operating Lever

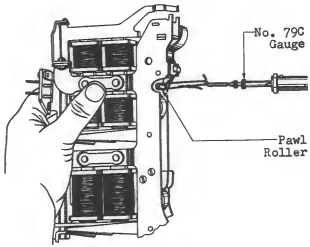

Fig. 25 - Measuring Tension of Pawl Roller Against Pawl Operating Arm

is near the minimum limit, readjust the gap as near the maximum limit as possible. By so doing the maximum pawl engagement can be obtained which, in turn, means a wider range for adjusting the pawl to meet both requirements.

3.21 Pressure of Pawl Roller Against Pawl Operating Arm (Rq.2.21)

(1) To check the pressure of the pawl roller against the pawl operating arm, remove the clutch from the frame as covered in 3.006.

(2) Loop a piece of twine over the roller and attach the No.79C gauge to the twine as shown in Fig.25. Measure the tension required to barely pull the pawl roller away from the pawl operating arm.

(3) Adjust the pawl spring lug as required with the No. 379A adjuster. Then remount the clutch on the frame as covered in 3.007.

3.22 Position of Helical Spring Adjusting Stud (Rq.2.22)

(No procedure)